



APPLICATION OF ANTIBACTERIAL FINISH ON MODAL/COTTON FABRICS WITH CITRUS RETICULATA PEEL EXTRACT

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ABSTRACT

The present investigation deals with studies on potentiality of extract from Orange peel as a source of Antibacterial activity. Orange is among the most popular fruits in the world, because the health advantage related with it is known to be numerous. Not only oranges are good for health, but also orange peels are excellent for the skin. Clothing is textile materials are not only the carriers of micro organisms such as pathogenic bacteria, odour generating bacteria, but also good media for the growth of the microorganisms. The Antibacterial property of fabrics is considered to be more important and inevitable finish for garments, which are in direct contact with human body. The orange peel extraction was applied on modal/cotton fabric by dip and dry method. Finish was applied in concentration (5g/l) on treated modal/cotton knitted fabric was determined. The antibacterial activity of the finished sample was assessed quantitative by AATCC-147 parallel streak test method in terms of bacterial reduction against the test organisms *Escherichia coli* and *staphylococcus aureus*. The antibacterial activity which was evidenced by clear zone of bacterial inhibition in qualitative test.

KEY WORDS: orange peel extracts, modal/cotton knitted fabric, Antibacterial activity, parallel streak method.

1. INTRODUCTION:

Textiles are often associated with the production of clothing. Although 'technical' textiles have attracted considerable attention, the use of fibers, yarns and fabrics for applications other than clothing and furnishing is not a new phenomenon. Nor is it exclusively linked to the emergence of modern artificial fibers and textiles.

Cotton fabrics offer ideal environment for microbial growth. Increasing global competition in textiles has created many challenges for textile researchers and industries. Therefore, medical textile finishes with antimicrobial finish is highly demanded in global. So it is necessary for human beings to wear antimicrobial finished textile products for healthy life style.

Modal is a 100 % biodegradable fabric made from the spun reconstituted cellulose of Beach trees. This fabric is bio-based, rather than natural. Fabric made from modal drape well and do not pile like cotton. It dyes like cotton and is color fast when washed in water. Modal fabrics resist fading, shrinking and the buildup of hard water mineral deposits even after repeated washing

Antimicrobial property of textiles is being considered to be an important and inevitable parameter for garments which are in direct contact with human body. Natural textiles in contact with the human body offer an ideal environment for microbial growth. Microbial infestations possess danger to both living and non-living matters. The consumers are now increasingly aware of the hygienic life style and there is a necessity and expectation of a wide range of textile products finished with antimicrobial properties.

2. MATERIALS AND METHODS:

2.1 Selection of fabric:

Modal/cotton yarn with the following specification of yarn count 30's was taken for the study. This fabric was scoured using a solution containing 5g/l of sodium carbonate and 3g/l of hydrogen peroxide was taken and then the pre treated sample was dyed using reactive dye.

2.2 Preparation of sample:

The fruits rinds of orange peel were dried under shade to remove the moisture content in the sample. After it has completely dried the fruits rinds were ground to a fine powder and sieved to remove any large residues. Then the dried orange peel powder obtained was used for the antibacterial as per AATCC standards..

2.3 Plant material extraction:

The methanolic and water extract of the powders of each is soaked in methanol for 24 hours to 10% concentrated solution, resulting in active substances being dissolved in methanol. The extract were filtered and used for antibacterial finishing.

2.4 Agar diffusion method:

The treated and untreated samples were placed in the AATCC bacteriostasis agar, which has been previously inoculated with test organisms. After incubation, a clear area of uninterrupted growth underneath and along the side of the test material indicates the antibacterial effectiveness of the fabric. The area of the inhibition zone is measure of antibacterial effectiveness of the

material.

2.5 Assessment of Antibacterial finished fabric - EN ISO 20645 test method:

In antibacterial activity of the finished fabric was determined by test method using sterile Bacteriostasis agar obtained from Himedia (Mumbai). The agar plates were prepared by pouring 15ml of media into sterile petri plates. The plates were allowed to solidify for 5 minutes and 0.1% inoculums suspension of *staphylococcus aureus* and *Escherichia coli* were swabbed uniformly and the inoculums was allowed to dry for 5 minutes. The herbal extract finished cotton fabric with the diameter of 20± 2mm was placed on the surface of medium and the plates were kept for incubation at 37°C for 24 hours. At the end of incubation, zone of inhibition formed around the fabric was measured in millimeter and then recorded.

2.6 Evaluation of antibacterial activity of fabric after coating with the selected herbs in qualitative method:

The herb coated modal/cotton fabrics were tested as per AATCC (American Association of Textile Chemist and colorist) standards of qualitative methods. The herb coated fabrics were ascertained by qualitative test method as recommended by AATCC method standards Agar Diffusion methods (SN19592). From the above assessment, the modal/cotton herb coated fabrics which showed the zone of inhibition were screened and selected.

2.7 Evaluation of the Effective Antibacterial herbal coated fabric:

The test dishes were removed from the incubator and were assessed for zone of incubation. This assessment made by visual examination as well as under a microscope with 40% enlargement. The evaluation was made on the basis of presence or absence of bacterial growth under the specimen after 18-24 hours of incubation. Finally, the result shows that orange peel herb showed good antibacterial effect.

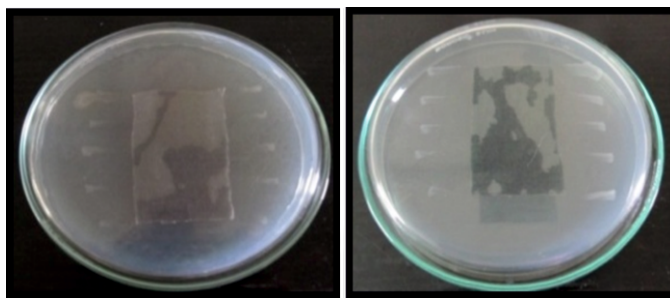


Plate-1 & 2
Escherichia Coli and *Staphylococcus Aureus*

3. RESULTS AND DISCUSSION:

In the present study, the phytochemical screening, antibacterial activity was performed with methanol extract of orange peel. The study was made against two pathogenic bacteria using the agar diffusion method.

3.1 Evaluation of antibacterial activity in herbal finished woven fabrics:

The antibacterial activity of the selected herbal extract was studied individually and the results showed maximum antibacterial activity. This type of treated samples shows good testing result.

Table-1

S. No.	Herbal extract	Antibacterial activity - Zone of Bacteriostasis (mm)	
		<i>Staphylococcus aureus</i>	<i>Escherichia coli</i>
1.	Citrus Reticulata	30	34

The above table-1 shows the zone of Bacteriostasis (mm) against *Staphylococcus aureus* and *Escherichia coli*.

3.2 Thickness of the selected fabric:**Table-2**

Sample	Before finishing	After finishing
1.	0.48cm	0.51cm
2.	0.51cm	0.53cm
3.	0.49cm	0.51cm
4.	0.53cm	0.55cm
5.	0.51cm	0.53cm

The above table shows the Thickness of before and after finishing of modal/cotton fabrics.

3.3 Abrasion resistance:**Table-3**

Sample	Average weight loss %	
	Before finishing	After finishing
1.	4.37	4.80
2.	4.45	4.90
3.	4.40	4.92
4.	4.46	4.85
5.	4.56	4.90

The above table shows the abrasion resistance of before and after finishing of modal/cotton fabrics.

3.4 Drapability of fabric:**Table-4**

Sample	Drapability	
	Before finishing	After finishing
1.	61.5	68
2.	63	69
3.	62	65
4.	66	68
5.	68	72

The above table shows the drapability of before and after finishing of modal/cotton fabrics.

CONCLUSION:

It may be stated that the present investigation highlighted that orange peel coated fabric shows good antibacterial activity against gram positive and gram negative bacteria. The finished samples increase in thickness, abrasion and drapability. This type of treated samples can use in the apparel industry.

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